

Appendices to March 6, 2001 Draft "Improving Science-based Environmental Stakeholder Processes"

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Appendix A--"Science Advisory Board Commentary on the Role of Science in 'New Approaches' to Environmental Decisionmaking that Focuses on Stakeholder Involvement," EPA-SAB-EC-COM-00-002, October 7, 1999

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October 7, 1999

EPA-SAB-EC-COM-00-002

Honorable Carol Browner
Administrator
U.S. Environmental Protection Agency
401 M Street, S.W.
Washington DC 20460

Subject: Science Advisory Board Commentary on the Role of Science in "New Approaches" to Environmental Decisionmaking that Focus on Stakeholder Involvement.

Dear Ms. Browner:

In recent years the Agency has devoted considerable attention to developing and promoting new, more flexible, and adaptive approaches to environmental regulation. Many of these address the problems of specific places, specific economic sectors, or especially vulnerable populations such as children or the disadvantaged. In all of these efforts, the Agency has worked hard to develop and use new strategies for enlisting the active advice and participation of relevant stakeholders. Of course, EPA has always sought and encouraged public input, but this new focus on stakeholder involvement is a welcome effort to make environmental regulation more democratically responsive. As a recent review by Yosie and Herbst¹ has shown, learning how to most effectively involve stakeholders is an ongoing process which deserves continuing attention.

¹Terry F. Yosie and Timothy D. Herbst, "Using Stakeholder Processes in Environmental Decisionmaking: An Evaluation of Lessons Learned, Key Issues, and Future Challenges," Ruder Finn, Washington, September 1998.

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Involving representatives of specific concerned or affected parties in environmental decision making is clearly important. However, the Agency also has a responsibility to represent the broad "public interest" in environmental decision-making. Cynics may argue that there is no such thing as "the public," only interest groups. But the concept of the general public interest lies at the heart of many of our most cherished democratic institutions. For example, we don't appoint a committee of the family of the accused and the family of the victim to try criminal cases. We appoint an unbiased jury and give them the mandate to determine the facts on the principle that in the long run justice based on factual truth serves the best interests of the public at large.

In a similar way, the interests of the general public are best served when, in addition to addressing the interests and needs of stakeholders, environmental decisions are also based on a full and careful consideration of all available science. Sometimes, such a full and careful consideration also serves the immediate interests of specific stakeholders. But often it does not. Polluters may be influenced by compelling short-term economic interests. Environmental activists may be motivated by their specific political agendas. Affected citizens may be motivated by perceptions, concerns, and political agendas that are only partially informed by available science. In short, involving stakeholders in the decision making process does not guarantee that decisions will be based on a secure scientific foundation and, therefore, does not assure that the broader public interest will be fully served.

Basing decisions on a careful consideration of all available science is a basic part of the EPA's mission. However, in the press of day-to-day operation even the Agency may be diverted from this mission. For obvious and legitimate political reasons, the Agency is interested in minimizing controversy. Especially in newer decision environments, which involve a greater focus on consultation and negotiation among directly involved stakeholders, there is a risk that the broad public interest in assuring that decisions are based on a full consideration of all available science may receive too little attention.

One way to minimize this risk is to work on evolving better mechanisms to assure that available science gets adequately reviewed for, and considered in, such decision settings. Equally important is the need to identify gaps in knowledge uncovered in such decision settings, so that research agendas can be responsive to these needs.

We enthusiastically support the Agency's efforts to develop and promote new, more flexible, adaptive approaches to environmental regulation. They are responding to an important need. As these new approaches evolve and mature, we urge you to lead the Agency in a more systematic consideration of how science can most effectively be reviewed for, and considered and used in, these new decision processes.

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For our part, to assist in this effort, representatives from the Science Advisory Board (SAB) have been participating in a series of internal workshops on “New Directions in EPA Science: Workshops on Innovations in Environmental Protection” being run by the Office of Research and Development. When these are complete, the SAB Executive Committee plans a series of its own workshops, to which selected Agency, SAB and outside parties will be invited to discuss how science is being reviewed and used, and how it might better be reviewed and used, in each of a number of new programs and offices. In advance of these workshops, we plan to invite a number of senior Agency officials to give us feedback on this commentary. Are we inappropriately concerned? Are there mechanisms already in place that adequately mitigate the risks we have discussed? Are there important aspects of the issue that we have perhaps overlooked and need to consider?

We hope you will support and join us in advancing this important agenda.

Sincerely,

/s/

Dr. Joan Daisey, Chair
Science Advisory Board

/s/

Dr. Granger Morgan, Chair
New Approaches Subcommittee
Science Advisory Board

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NOTICE

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public, and is posted on the SAB website (www.epa.gov/sab). Information on its availability is also provided in the SAB’s monthly newsletter (*Happenings at the Science Advisory Board*). Additional copies and further information are available from the SAB Staff.

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**U.S. ENVIRONMENTAL PROTECTION AGENCY
SCIENCE ADVISORY BOARD
NEW APPROACHES SUBCOMMITTEE**

CHAIR

Dr. M. Granger Morgan, Carnegie Mellon University, Pittsburgh, PA.

MEMBERS

Dr. Richard J. Bull, Battelle Pacific Northwest National Laboratory, Richland, WA.

Dr. Terry F. Young, Environmental Defense Fund, Oakland CA.

CONSULTANT

Dr. William Glaze, University of North Carolina, Chapel Hill, NC.

SCIENCE ADVISORY BOARD STAFF

Dr. Angela Nugent, Designated Federal Officer, Environmental Protection Agency, Science Advisory Board, Washington, DC

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**Appendix B--Summary of the Four Workshops Conducted by the SAB
Executive Committee on the Role of Science in Stakeholder-based
Environmental Decision Processes**

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B.1. Meeting with Agency Official: Science and Stakeholder Involvement in the Agency's New Approaches

Date and Time: November 30, 1999, 1:00-3:00 pm, during the SAB Executive Committee Meeting

Purpose: To discuss with agency leader's the Board's Commentary EPA-SAB-EC-COM-00-002, "Commentary on the Role of Science in "New Approaches" to Environmental Decisionmaking that Focus on Stakeholder Involvement"

Welcome and Introductions - Dr. Granger Morgan welcomed participants and asked them to introduce themselves and give a brief description of their organization. He then summarized the Commentary letter, described the SAB's plan for a series of workshops on the topic, and then invited Agency representatives to give advice and guidance to the Board.

Discussion. Mr. Dave Davis (Office of Water) began the discussion with the caveat that "nothing is broken" with Agency stakeholder processes. He stated, however, that it was appropriate to examine how to address technical issues that arise at different scales of decision making, such as at the local level or the ecosystem level. He identified the National Estuary Program (NEP) as a well-established program that has significant resources and a process for creating Community Advisory Councils. He characterized the NEP approach as "workable."

Dr. Norine Noonan (Office of Research and Development) stated that the Agency was faced with "tough problems" that pose major challenges in time and scale. The Agency is faced with assessing and addressing ecosystem impacts, long-term effects of pollutants, cumulative risks, and inter-generational impacts. Scientific tools are not available for addressing these complex issues, yet communities want to know impacts. There is a need to establish a framework for dealing with stakeholders, before specific tools are available.

Ms. Elizabeth Cotsworth [Office of Solid Waste and Emergency Response (OSWER)] introduced her office as one that does not specialize in science, as does Office of Research and Development. Her offices uses multiple processes to identify the different kinds of science related to an issue and then uses Agency science as a catalyst to get more scientific information from stakeholders. As a result, work on issues generates a mixture of science and stakeholder involvement. OSWER uses a variety of peer review processes to tease out the science.

OSWER has also developed Technical Assistance Grants that enable community groups enlist independent consultants who help them address science issues.

Ms. Cotsworth described a mechanism her office used to involve stakeholders in the scientific issue of removing silver as a toxicity characteristic. Stakeholders were asked to nominate a pool of peer reviewers. Peer review proceeded to evaluate available science.

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Mr. Davis then suggested the Board make a distinction in its thinking on stakeholder processes between activities that involve stakeholders in EPA decisions and activities where EPA is providing information and science to help stakeholders make decisions.

Mr. James Hanlon (Office of Water) pointed out that most environmental programs are delivered by state and local governments through well-established processes. Some new approaches, such as community-based environmental protection and Project XL are examples of where EPA has set up new processes. He suggested that it was a legitimate question of how to ensure science in those efforts.

Dr. Carl Mazza [Office of Air and Radiation (OAR)] stated that the Air Office generally focuses on national policy, not site-specific decision making. He suggested that the variety of stakeholder processes at EPA varies greatly, and no one approach was appropriate for all.

Dr. Mazza explained that at the national level, his office works with the Clean Air Advisory Committee, where technical papers are presented that generally do not have peer review. Once the Agency decides to take and act on the advice of the Committee, however, the science component of the advice is scrutinized and peer reviewed.

At the national level, EPA's Indoor Air Program brings together stakeholders from industry, the building trades and other groups for developing guidance documents. The program has developed a facility for peer reviewing their guidance.

OAR has developed negotiated rules within the Maximum Achievable Control Technology Program. The science has involved establishing a baseline that describes practice that the Agency can set as a baseline. These negotiations are followed by a formal proposal, where technical documents are scrutinized.

OAR is embarking on a national-level effort to address air pollution related to airports. Stakeholders will be involved in developing emissions inventories and a variety of analyses. The Agency has yet to determine whether and how review of technical documents will happen.

Dr. Terry Young asked about the relationship between the Agency's technical work and stakeholder consensus. What happens if the technical work indicates a different direction than the stakeholder process?

Ms. Cynthia Dougherty (Office of Water) explained that regulatory negotiations require an initial agreement among parties about the scope and purpose of negotiation. In that process, EPA must be careful not to cede authority to make certain decisions to the negotiation processes. In some cases, stakeholders identify issues or evaluate what can be accomplished by a technology. Then EPA will provide this information to its personnel who will conduct a risk assessment.

In the Microbial Disinfectant Byproduct (MDB) Rule in Phase Two, the not-for-profit group, RESOLVE is working with stakeholders to identify an array of scientists to make presentations to the stakeholder group. Through that process the group will learn about EPA's science and industry's science. Once that process is concluded, EPA will conduct its risk assessment.

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Dr. Noonan interjected that the "best science is in the eye of the beholder." She commented that it is difficult to give stakeholders an understanding that science is dynamic, that it has areas of disagreement and uncertainty, but that rulemaking and decision-making still have to happen. Ms. Dougherty commented that the MDB process will benefit from stakeholders' broader understanding of scientific uncertainty.

Dr. Robert Ward (Office of the Administrator) pointed out the important role that "neutrals" (e.g., facilitators, negotiators, fact-finders) play in stakeholder processes. He commented that neutrals, as well as Agency participants, may vary in the experience and knowledge they bring to environmental issues. As a result, stakeholder processes may have varying effectiveness.

Mr. Jeff Morris (ORD) focused his remarks on the SAB question "Are there mechanisms in place to ensure that stakeholder involvement does no harm to the science?" He suggested that for regulatory development, mechanisms were in place theoretically, if ORD were engaged early in the peer review process. For non-regulatory processes, however, he suggested that the Agency did not know if mechanisms were in place.

Dr. Noonan followed his comments with several observations. When a specific site is at issue, a community often wants scientific information it doesn't have. How does a community obtain that information? Or work with whatever information is available? She suggested that local issues, like those at Tom's River, indicate that communities have questions and may use information that is not always validated. EPA doesn't always understand what's happening at these sites.

In response to a question from the Chair about how to integrate science in the process and whether there might be a need for applied social science research on this issue, Dr. Noonan responded that ORD has been working with the National Environmental Justice Advisory Committee to develop a research agenda.

Dr. Peter Grevatt (OSWER) then described activities in the Superfund program. He commented that on some of the site-specific projects, there are Superfund Community Working Groups, where a broad range of stakeholders have been participating in working groups at the community level. These working groups, convened by EPA, have also included the Agency for Toxic Substances and Disease Registry. There are opportunities to identify information needed by stakeholders (e.g., bioavailability studies) and provide that information. The general purpose of the Working Groups are to help people understand and contribute to the process.

Dr. Gerald Filbin (Office of Policy, Economics, and Information) suggested that despite the Agency's negotiated processes and new social profiling tools, the Agency must still find ways of taking stakeholder input seriously.

Ms. Claudia Walters (Office of Research and Development) discussed a major transition underway for ORD. Her office in the past has primarily dealt with national scientific issues. Community-based science projects have raised novel issues: how to translate and deliver science to specific locations, and how to address the resource needs associated with a community science

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program. She informed the group that ORD has developed a Community Science Team. It has also held two Agency workshops in a series of 5 overall on the topic of community assessment. To date, the workshops have focused on community-level questions and the information available to answer them. The workshop planned for February will focus on how to address information gaps. Future workshops will deal with issues of building community capacity and communicating science to communities. She also stated that ORD has completed an inventory of its own community assessment tools.

Dr. Linda Greer (SAB Executive Committee) noted that there is an important distinction to be made between situations when the science on an issue is not certain and situations where science has something clearly to offer the process. She emphasized an important difference between providing information and data to community groups, as opposed to providing science to them

The Chair then invited comment from all in the room on the topic of science and stakeholder involvement. Dr. Thomas Beierley (Resources for the Future) commented that his research has shown cases where stakeholders have taken action to seek out and create the science they need (e.g., stream monitoring) and that stakeholders' agreement on strategies to find the facts have helped to address and resolve disputes.

Mr. Dave Clarke (Chemical Manufacturers Association) encouraged the SAB to address the topic of science and uncertainty. Dr. Gail Charnley (Healthrisk) pointed out the need for research on science and stakeholders. She is working on a project for the American Industrial Health Council which will be an integrated study of science, decision-making and stakeholder involvement. It will rely primarily on case studies. Dr. Eugene Rosa (Washington State University) asked whether there is an assurance that the selection of stakeholders truly represent the diversity of public interest in an issue.

Ms. Kathleen Bailey (Office of Policy, Economics and Information) encouraged the Board to involve regional offices in future discussions and suggested a videoconference mechanism. She also identified two professional associations of "neutrals" that might be a resource to the Board: the International Association for Public Participation and the Society of Professionals for Environmental Dispute Resolution.

Mr. Dave Davis suggested that the Board pick a subset of stakeholder involvement activities for a focus. He suggested that the Board look at community-based efforts, estuary activities or watersheds, where EPA is providing information and tools to communities and the communities are combining intuition and analysis to reach their decisions. Mr. James Hanley suggested that the Board focus on watershed efforts to develop Total Maximum Daily Loads, since that program is a major current initiative. Mr. Thomas Carrato (Monsanto, Liaison with the Children's Health Protection Advisory Committee) suggested that the Board focus on issues where the science is least certain and decisions are most emotional and intuitive).

Action item(s):

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1. The SAB Executive Committee will hold a second workshop on Science and Stakeholder Involvement on March 7, 2000, where there will be presentations of research and analyses on this issue.

2. The DFO for the Executive Committee Workgroup on New Approaches, Angela Nugent, will contact participants, as needed by the workgroup, for additional information on their stakeholder involvement activities.

B.2. Workshop on the Role of Science in Stakeholder Processes

Date and Time: March 7, 2000, 2:00-5:00 pm, during the SAB Executive Committee Meeting

Introduction

Dr. Morgan opened the discussion with an introduction that provided background on the SAB Commentary (October 7, 1999) that stated the Board's support for new, more flexible and adaptive approaches to environmental decision making. The Commentary also stated the Board's concern that the broad public interest in assuring that decisions are based on a full consideration of all available science may not always receive as much attention as it should in . new approaches that increase emphasis on consultation and negotiation among directly involved stakeholders.

He introduced the goals of the session: (1) to review what others who are studying the issue have learned about how science has been reviewed and used in stakeholder processes, and (2) to examine a number of specific case examples of how science has been or is being reviewed and used.

He identified two objectives for the workshops undertaken by the Board: (1) to suggest a set of best available practices that the Agency might promote and (2) to identify applied social science research that could significantly strengthen the review and use of relevant science in stakeholder decision processes.

Presentations and Discussions

The first presenter was Dr. Juliana Birkhoff, Director, Center for Research and Education, at RESOLVE, Inc. She summarized the results of a study just completed in collaboration with the United States Institute for Environmental Conflict Resolution in Tucson, Arizona, and the Western Justice Center Foundation in Pasadena, California. , entitled "Managing Scientific and Technical Information in Environmental Cases; Principles and Practices for Mediators and Facilitators." She described: (1) several categories useful for understanding different kinds of stakeholder processes (e.g., by branch of government they relate to and by intended goal or outcome); (2) the focus group process she used to gather information; (3) barriers that mediators and stakeholders encounter in addressing scientific and technology issues; (4) successful strategies that they have used; and (5) suggestions for further research and applications of her findings.

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Action: Dr. Morgan asked SAB Staff to provide a copy of Dr. Birkhoff's slides and draft paper to Executive Committee Members.

The second presenter was Mr. Jeffrey Morris, Office of Research and Development, Office of Science Policy. He spoke on "Stakeholders and EPA Science: An ORD Perspective." He described four different cases where ORD has engaged stakeholders in its work: (1) Science Planning 2000 (SP2K); (2) Border 21; (3) EMAP/MAIA; and (4) the Eastern Columbia Plateau Aquifer. In his view, these efforts helped ORD meet its goal of sound science in support of the Agency's mission.

The next part of the workshop addressed science and stakeholder issues in selected National Estuary Programs (NEP). Ms. Holly Greening, Senior Scientist, Tampa Bay Estuary Program, presented an overview of how modeling and other science activities have influenced the work of her Program. She emphasized the importance of modeling in building understanding of the importance of reducing nitrogen loadings. Mr. Jake Stowers, Assistant Administrator for Pinellas County and Mr. Greg Williams, Environmental Manager for IMC-Agrico, both participants in the Tampa Bay Nitrogen workgroup, participated by phone. They emphasized the importance of the goal set by the Tampa Bay NEP, to increase sea grass production, and the importance of the Nitrogen model in helping participants understand how to address the goal..

The second speaker to describe science and stakeholder activities in an NEP was Dr. Joseph Costa, Executive Director, Buzzards Bay Project National Estuary Program. He described the development of a citizen-based water quality monitoring program that had major impacts: (1) it increased citizen awareness of environmental conditions; (2) local citizens used the information to influence local authorities to make decisions regarding land use and pollution run-off; and (3) it also helped the NEP refine its Nitrogen loading strategy and goals so that it was able to set standards for more sensitive areas.

The final NEP speaker was Ms. Nancy McKay, Chair, Puget Sound Water Quality Action Team. She emphasized how her NEP, like all NEPs has a Citizens Advisory Committee, developed with broad stakeholder involvement, which works with a Science Advisory Committee. She listed numerous accomplishments of these two groups working together, including: (1) opening of shellfish beds previously closed despite rapid growth in the Puget Sound area; (2) establishment on standards for contaminated sediment; (3) monitoring program that publishes an annual report; (4) development of performance measures, Puget Sound Health 2000, distributed to over 400,000 households; (5) research conferences held every two years to bring decision makers, students, citizens and scientists together; (6) education efforts including a program designed to helping sector groups (e.g., dry cleaners) take research on the Sound and apply it to educating members of their sector to take voluntary action.

She identified several issues for attention: (1) how to reach beyond people immediately involved in NEP activities to influence and involve broader stakeholder groups; (2) how to obtain reliable data on issues of concern, such as long-term monitoring and conditions of near-term habitat; and (3) how to

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ensure that new environmental activities, such as new investments in EMAP, can supplement and complement NEP activities.

The Executive Committee then engaged in a general discussion of science and stakeholder involvement. Members identified a need to clearly define the term "stakeholder." They also identified a range of possible stakeholder involvement efforts to explore in future workshops, including:

1. Food Quality Protection Act and Pesticide Tolerance activities
2. Industrial Combustion Council rulemaking
3. Pollution Prevention Activity with Dow Chemical
4. Cal Fed
5. Some case study that directly addresses the stakeholder identification issue
6. Stakeholder programs run by World Bank (e.g. world commission on dams)

Action: Dr. Morgan asked SAB Staff to schedule a follow-up discussion of next steps for the New Directions Workgroup of the Executive Committee.

B.3 Workshop on the Role of Science in Stakeholder Processes

Date and time: July 12, 2000 from 2:30-5:30 pm during the SAB Executive Committee Meeting

Introduction

Dr. Granger Morgan introduced the session, the third of four planned workshops at the Executive Committee meetings to focus on science and stakeholder involvement. He mentioned that the Executive Committee intended to include the following topics in the fourth workshop: an overview of science and stakeholder issues presented by Gail Charnley and additional case studies involving lay participants and controversial and interesting science. These case studies may address the CALFED process, the Dow Pollution Prevention Experience, the Microbial Disinfection By-Products Rulemaking, and science and the implementation of requirements for Total Maximum Daily Loads.

Presentations and Discussions

Three presentations followed. Mr. Thomas Beierly (Resources for the Future) reported on preliminary results and preliminary conclusions from research funded by the National Science Foundation on 225 cases involving stakeholder involvement. His final analysis will address many issues, including several involving science in stakeholder processes. His presentation to the Executive Committee addressed the following questions: (1) are stakeholder processes leading to better or worse science? (2) are there checks and balances on the road to implementation?; and (3) how to benchmark the effectiveness of science in stakeholder process.

He summarized briefly his model for analyzing individual cases and coding information to be analyzed quantitatively. His methodology included capturing information in each case about: (1) the

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wider public; (2) the problem being addressed; (3) the participants directly involved; (4) the Agency involved; (5) aspects of the process; (6) process outcomes; and (7) substantive outcomes.

Early analysis shows that the cases fall into the following categories: (1) slightly more than half were risk-related; (2) more than half involved state and local government and addressed site- or region-specific issues (27 cases identify EPA as the lead Agency); and (3) the cases were fairly evenly divided by type of process (information exchange, advisory without consensus, advisory with consensus unclear, advisory with consensus, and negotiation/mediation). Processes for identifying stakeholders varied across cases. In some cases, organizers of the processes actively identified all groups involved and tried to find representatives of each; in other cases, "whoever walked in the door" participated. Generally, stakeholders tended to be professional representatives of interest groups that had a stake in the issue being discussed.

One major early conclusion presented indicated that stakeholder involvement generally led to better decisions than would have been made otherwise. Quality of decisions was assessed in three ways: (1) direct measures (cost-effectiveness, pareto-optimality; opinions expressed); (2) indirect measures (added information, technical analysis, innovative ideas, holistic approach); and (3) process measures (improved access to technical information, improved technical capacity. Evidence of greater substantive quality primarily was indirect and/or procedural.

Mr. Beierly then discussed two cases in detail. The Fernald Citizens Task Force involved a 15-person consensus-based advisory committee addressing a complex clean-up decision for a weapons site. The committee participated in a 2-year process. It was noteworthy for its use of a tool-box provided by the Agency and its technical consultant (the toolbox distilled technical information on main topics into 2-page synopses) and the use of "Future Site," a board game to look at different scenarios for cleanup that helped the committee work with multiple complex factors and options. The process resulted in a decision that recommended a mix of on-site/off-site disposal options that minimized soil disruption and protected the aquifer. He characterized the result as a faster, cheaper, more holistic solution than would have otherwise been reached.

The next case involved the Buffalo River Citizens Committee, an Advisory Committee, where consensus was not required. The goal was to reach a decision on a restoration plan, where there was limited information. The process involved "high capacity" stakeholders, use of outside science, emphasis on information gathering. The stakeholders developed a dataset used for the decision.

Mr Beierly's presentation then addressed the relationship between political and technical issues in the cases studied. He suggested that they were intertwined. Sometimes scientific uncertainty appears as a source of conflict. There are themes of mistrust of information and expertise. Technical evaluation criteria are challenged and a source of dispute. He contended, however, that solving technical problems can also lead to resolution of political problems, that the "science and technical can work together." He came to this conclusion because he saw the following themes appearing in cases: (1) sometimes conflict is resolved by resolving scientific disputes (especially through joint fact-finding);

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and (2) trust is formed through equal access to expertise and technical information. He suggested that his preliminary results showed a relationship between consensus-based processes and cases associated with higher quality factors, although he gave the caveat that consensus-based decisions may also involve more time, resources, and are typically more intense processes that in themselves might lead to higher levels of quality.

On the topic of checks and balances, he informed the audience that stakeholder processes appear to have a direct influence on decisions in 65% of cases and some influence in 90%, but that their impact on implementation was still an open question. Many of his case studies show little relation between decisions made and actual implementation achieved, and published literature also bears out this conclusion. Many intervening forces may explain this disconnect: bureaucratic agenda and funding; politics; pressure from a wider public and the media.

The last major topic discussed involved the baseline for assessing stakeholder processes. Mr. Beierly suggested that if the baseline was "managerialism," this "traditional" decision-making process was also subject to political, non-technical influence. He also suggested that in American society there is no consensus on whether such influence is a bad or good thing. If Americans are indeed worried about politics or political influence, he suggested that at least stakeholder processes are open and would make the decision-making process transparent.

He concluded that the case study record was generally reassuring. More cases lead to high quality decisions than not; there are many "bumps in the road to implementation," and "decision-making as usual" is a low hurdle when one is measuring the quality of cases involving stakeholder processes.

General discussion then followed. Executive Committee members asked about how the study controlled for publication bias. Mr. Beierly answered that the data was coded for obvious preselection (e.g., it indicated whether people writing up the case studies were involved vs. whether it was written up by an academic, whether it was begun early in the process before the outcome was determined). He also suggested that authors differed in their definitions of success from each other and from the definitions used by the study.

Dr. Morgan and others asked whether the data could be analyzed to address several issues of particular interest to the SAB: (1) were cases involving negotiation and mediation distinctive?; (2) are cases involving EPA distinctive?; (3) are there different patterns if the case involves local, state, regional or national issues?; and (4) are there any conclusions to be reached about cases where third-party neutrals were involved in the process. Mr. Beierly indicated that he would be willing to investigate these questions and provide the Executive Committee with information, along with an early version of his final report.

The second presentation took place by teleconference. Dr. John Toll from Parametrix presented the experience of stakeholder processes in environmental decision-making in the Duwamish Estuary in Washington State. He had prepared the briefing in collaboration with Ms. Sydney Munger, Senior Water Quality Manager for the King County Department of Natural Resources. In his

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presentation he described the purpose of the project [which engaged stakeholders to advise the County executive on whether the risks associated with combined sewer overflows (CSOs) worth the \$300,000,000 it will cost to control CSOs to the Washington State Standard and the next steps for the King County CSO control program]. He described how the project identified stakeholders and engaged them intensively in a two year process of identifying values to protect in the estuary and agreement on findings of risk. He described that the process resulted in stakeholders' high satisfaction with the work of the committee and increased level of trust. He also indicated that the process for identifying alternative options for spending the \$300,000,000 was not made clear to the stakeholder committee, and the "County should have addressed how redirected \$\$ might be used to achieve community values." He concluded the presentation with some recommendations for research: (1) how to manage conflicting time lines; (2) values to be protected vs. measurement endpoints; and (3) rules of evidence for data admissibility, boundary issues, and stopping rules.

The Committee then engaged in a short discussion. They observed that problem definition was key and wondered whether there was freedom to identify water quality problems "bigger than CSOs." They also noted that the process used was expensive for the agency and the stakeholders involved and noted that the process designed only to allow stakeholders a limited range of options for their work and potential conclusions.

The final presentation, made by Dr. Henry Topper (US EPA, Office of Pollution Prevention and Toxics) addressed the topic "Science in the Community: Lessons from the Work of the Baltimore Air Committee." He described how his office in EPA entered into the Baltimore Community Environmental Partnership formed in 1995 to address neighborhood problems and then committed three years of working on issues identified by the partnership, especially through its Air Committee. His particular efforts focused on community air concerns and resulted in a publication, "Baltimore Community Environmental Partnership Air Committee Technical Report; Community Risk-based Air Screening: A Case Study in Baltimore, MD," (April 1990). He suggested that the committee's work resulted in the following outcomes: (1) the assessment, drawn on available national, state and local data, indicated that the sources of air pollution were different than those originally feared by the Partnership and the assessment provided important information; (2) consensus in the Baltimore community was not sufficient for clear action; and the (3) partnership organization was not sustained after the completion of the assessment.

He identified several lessons learned regarding the role of science: (1) science carried out with community participation can help overcome divisions; (2) science must be focused on action; (3) local partnerships can mobilize new resources for local assessments; (4) environmental concerns must be put in broader community context; (5) EPA capacity to apply science at community level needs further development (e.g., methods tools and information, more resources and better coordination for community science efforts, training for EPA scientists to understand and value community input and to participate in local partnerships) and (6) building local capacity is also key to success.

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The Executive Committee then began a brief discussion on next steps for developing advice for the Agency on science and stakeholder involvement. Dr. Morgan suggested that the Executive Committee subcommittee will be drafting a letter which would comment on the strengths and limitations of the approaches known by the Board, either through briefings received during the workshops during the Executive Committee quarterly meetings or through individual members' experience. The letter would identify good practices and advice regarding needed research (e.g., research on the iterative process for providing technical information to stakeholders.). He asked for preliminary suggestions from members for topics to be addressed in the letter.

Dr. Roger Kasperson suggested that the Board consider how to define success for the use of science in stakeholder process. Mr. Beierly's presentation focused on the impact on the quality of decisions. Dr. Topper's presentation introduced the element of capacity of capacity building at the community level to improve public health from the bottom up. Dr. Kasperson also suggested that community assessments incorporate the notion of differential community vulnerability (e.g., the question of integrating environmental hazard with social and economic vulnerability that would include indicators for public health, poverty, access to a variety of services). He also suggested that any discussion of costs of stakeholder processes consider this investment as a new one that needs a benchmark of comparison. He suggested that the apparent large size of investments in meaningful stakeholder involvement may be low in cost as compared to environmental benefits from averting or reducing risks or to the cost of a regulatory process.

Dr. Ken Cummings suggested that the subcommittee also consider whether scientists are the key players to be involved in a stakeholder process. He suggested that other professional groups, such as educators, might have the skills needed to help a group reach a decision. He suggested that problems be examined for the "evidence that science is needed."

Dr. Andy Anderson commented that community-based stakeholder processes, like Baltimore, need to involve the local infrastructure, such as the local health department. Dr. Mark Utell agreed that environmental issues at the local level involve many other health determinants.

Dr. Morgan adjourned the session at 5:30 pm with thanks to presenters and participants.

B.4 Workshop on the Role of Science and Stakeholder Involvement

Date and Time: November 1, 2000 from 1:15-4:45 pm during the SAB Executive Committee Meeting

Introduction

Dr. Granger Morgan introduced the session, the fourth of four planned workshops at SAB Executive Committee meetings to focus on science and stakeholder involvement. He discussed a process for drafting a report, based on information received at the workshop: (1) Dr. Morgan, with the assistance of the Designated Federal Official, Dr. Angela Nugent, will draft a report to be circulated for

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review by the Executive Committee in January; (2) the SAB Executive Committee will discuss the revised draft at the planned retreat of the Executive Committee in the spring of 2001. Dr. Nugent added that there will also be a public teleconference to discuss the SAB workgroup's initial findings for the Commentary.

Dr. Morgan identified the current members of the SAB workgroup, Dr. Terry Young, Dr. Richard Bull, who would continue as a consultant to the SAB Executive Committee for fiscal year 2001 for this project, Dr. Henry Anderson, Dr. Roger Kasperson, and potentially Dr. Rhodes Trussell, who will be invited to join the group. Dr. Morgan asked other members of the Executive Committee to let him know if they would like to join the group developing the report.

The Workshop generally followed the agenda with two exceptions. Dr. Linda Greer, SAB Executive Committee Member, did not discuss the Michigan Source Reduction Initiative and Dr. Jeffrey Griffiths, Tufts University, did not participate by phone in the panel discussion of Microbial Disinfection By-Products.

Presentations and Discussions

The first topic discussed was a case study involving national and regional perspectives on science and stakeholder involvement in the Total Maximum Daily Load (TMDL) program. Mr. James Pendergast from EPA's Office of Wetlands, Oceans and Watersheds began his presentation by addressing the relationship of science to policy in the TMDL program. By statute, TMDLs set the maximum amount of pollutant that can exist in a water body that meets Water Quality Standards. In addition, TMDLs assign responsibility for exceeding maximum limits to different sources, so that the sum of source contributions do not exceed the total maximum limit permitted. Thus TMDLs are a combination of science and policy.

Mr. Pendergast provided historical background on the program. States have reported that 20,000 waterbodies do not meet Water Quality Standards. As a result, states are required to complete more than 41,000 "pollutant-waterbody" TMDLs. The most frequent causes of failure to meet standards are: (1) excessive erosion and soil deposition; (2) nutrients; and (3) pathogens. These causes are related to non-point sources: agriculture, septic tanks, air deposition, and legacy pollutants. He estimated that point sources are responsible for only 10% of the problems.

Mr. Pendergast stated that in setting TMDLs, states take three steps: (1) assessing the problem (this step is called "listing"); (2) identifying causes of the problem (step usually involves modeling); and (3) allocating responsibility. Science is involved in the assessment process through collection of information and judgements about whether that information is sufficient to assess water quality. Science is also involved in the second step, which focuses on cause and effect relationships. In the third step, allocation of responsibility, there is no science or limited science involved. States make decisions about allocating TMDLs to sources based on criteria such as equity. Some states, however, are beginning to consider trading-based solutions; these efforts may involve science in the future.

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Mr. Pendergast then discussed how the public gets involved in the TMDL process. At the national level, there is a requirement to review Water Quality Standards every three years. Science is used to set standards and the public may comment on those standards through a notice and comment process. Then states follow listing procedures comparing data on their waterbodies against the national standards. Procedures differ across states; not all states have public review. EPA's TMDL rule of July 13, 2000 called for more systematic public involvement at this stage; this rule was made subject to a Congressional rider and cannot be made effective before October 30 2001.

In the second stage, identifying "cause and effect," the process generally happens in a "black box" and the public has a hard time understanding the science. EPA is developing a clearer process for updating the models through the Agency's Committee on Regulatory Environmental Models.

Mr. Pendergast stated that the Agency is also engaged in a Consolidated Assessment and Listing Methodology (CALM) Project to improve the use of science and information in determining impaired waters. To develop CALM, the Agency is using a stakeholder process involving industrial trade groups, agriculture groups, waterwork treatment agencies, environmental groups and local governments. These groups were identified through the Agency's process of developing the TMDL rule; they represent major groups with an interest in the TMDL program. The goal of the stakeholder process is to identify major elements for draft guidance on the collection and analysis of data to be used in the determination of impaired waters.

SAB members enquired whether there had been an effort to involve the general lay public, as opposed to organized groups affected by the rule. Mr. Pendergast stated that the public involvement process had principally focused on interest groups. These groups have strong interest in how states use data to make listing decisions and how they might make better use of existing data. He stated that the general public could comment on the document, once developed, through a formal notice and comment process.

Dr. Patricia Cirone, from EPA's Region X, spoke to the Executive Committee by phone about her experience in developing TMDLs for the Mid-Snake River and the Columbia River. She described how the State of Idaho and an affected County came to EPA because they were looking for expertise in Watershed Assessment for developing a TMDL for the Mid-Snake. She believed that these "publics" wanted EPA science because they were seeking solutions to their "clogged eutrophic system" and wanted science to force some solutions.

In response to this request, EPA made available an expert modeler who tailored a model to the specifics of the Mid-Snake (e.g., added system dynamics, the multiple driving sources, benthic community dynamics, data collected). This formed the basis of a watershed-level Ecological Risk Assessment.

Dr. Cirone described how the Agency worked with the involved public. The Agency requested and received peer review from the community and from local universities. Agency representatives worked with the Watershed Council. EPA invited participants to contribute what they

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knew and observed to the Agency's model. They gave introductory briefings on risk assessment and the mathematics and logic behind the model. They attended many meetings, sometimes with PCs and maps, to demonstrate the models used. The participants at the meetings included people who lived in the area, commissioners of affected counties, members of environmental organizations, state and county agencies involved, and owners of the hatcheries and Dams.

As the process developed, attitudes toward the science changed. The interested public came to feel the model was too complicated and wanted to provide the regulated community with information and assessments more similar to assessments used in the past. A court decision also called for a quick decision on the TMDL. In the end, the state used a simple, quick way of deciding the TMDL.

Dr. Cirone suggested that different people or institutions became involved with the science in different ways. State and local agency staff contributed technically to the Agency's risk assessment. The general public related to the conceptual models used, e.g., to the question "what do you think is causing the problem?"

Dr. Terry Young raised the question of whether the stakeholder process prevented the Agency and the TMDL decision makers from focusing on a major cause of water quality issues in the mid-Snake, upstream dams. Dr. Cirone agreed that indeed flow restriction was the major single factor changing the system. She pointed out, however, that the TMDL program is a pollutant-by-pollutant program. The critical role of impoundments dropped out as decisions were made, even though people had initially identified impoundments as a key part of the conceptual model. She suggested that even though the TMDL decisions did not focus on the dams, the risk assessment process educated decision makers and local citizens in the roles dams played.

Dr. Morgan posed questions about resource investment in the Snake, including staff time to develop a model in a custom model for the Snake River and in its public involvement efforts for the case. He asked if it was too expensive (resource intensive) to do such work for all impaired waterbodies. Dr. Cirone answered yes, with the qualification that the model developed was generally applicable and that it was being used on the Columbia River. She believed also that there was long-term value associated with several aspects of the effort: (1) education and capacity building associated with the Mid-Snake project; (2) documentation of the damage done by impoundments, evident in the ecological risk assessment completed; and (3) ongoing use of the model. She suggested that the stakeholder group learned several things from their exposure to the model-building and risk assessment process. She believed they came to appreciate the uncertainties involved in measurement as well as modeling. Through the process they came to understand that the hatcheries weren't the only cause of the problem in the Mid-Snake; instead there were multiple stressors including dams, irrigation returns, and irrigation withdrawals. They also came to understand that water quality problems did not only exist in the tributaries, but also in the main stem as well.

Dr. Cirone then responded to a question about the contributions of public participation to the science and to the quality of the decision. Dr. Cirone said that the Agency developed a more "realistic

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understanding" of how the system developed and how it may develop in the future. Agency staff learned about information and literature useful for the model and ecological risk assessment.

The second topic at the workshop was a presentation by Dr. Gail Charnley, from HealthRisk Strategies, who spoke on her recent study, *Democratic Science; Enhancing the Role of Science in Stakeholder-Based Risk Management Decision-Making*. The report was commissioned by the American Chemistry Council and the American Industrial Health Council. In the report she examined case studies that demonstrated that effective stakeholder processes are central to risk assessment and risk management because stakeholders can contribute important information and because stakeholders are critical to problem formulation. From the case studies she examined, she concluded that "scientific integrity is maintained and its credibility is assured when stakeholders are involved in deciding how science is used to answer their questions and in obtaining the scientific information needed to answer their questions." She argued that the case studies demonstrated the value of implementing the "analytic-deliberative process," as described in the National Academy of Science report, *Understanding Risk*. Science was used less successfully, she found, when there were teams of dueling scientists and parties were only interested in science when it backed their own point of view.

She summarized research needs identified in her report: (1) research evaluating how science has been included in stakeholder-based decision-making and how its role has had an impact on process outcomes; (2) analysis of the social factors that contribute to differing interpretations of scientific information and the role science plays, weighed against many other factors that contribute to managing risks; and (3) analysis of the relative roles that science, stakeholder collaboration, and political expediency play in risk management decisions.

Dr. Joe Mauderly asked whether it is possible to manage a process to engage stakeholders in the science involved in an environmental issue when the problem is not a one-time effort, but instead a continuing process, like the development of National Ambient Air Quality Standards. Dr. Charnley agreed that it may be difficult to coalesce and sustain such intense ongoing efforts. She questioned the scope of the term "stakeholder involvement" and called for more attention to the definition and whether it included activities covered by the Administrative Procedures Act and democratic processes more generally.

Dr. Roger Kasperson then enquired about whether the controversies in several of the cases involved the issue of who should have control over decisions and the consent required for decisions. Dr. Charnley responded that scientists generally are more effective when they listen to and understand the social and policy context for their work.

The discussion then turned to the question of problem formulation. Dr. Richard Bull expressed concern over Dr. Charnley's conclusion that successful use of science involved stakeholders' helping to formulate problems and identify what science is needed. He cautioned that in the Mid-Snake TMDL case, stakeholders "defined out" some important aspects of the science for decision making. Dr. Hilary Inyang raised a similar view, especially for science issues that are not place-based and instead are

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national in scope. He asked about the relationship of stakeholders to democratic processes and asked about mechanisms to protect members of the public whose economic interests are not immediately affected by the decisions at stake in a major way.

Dr. Janet Johnson asked about the resources needed to invest in resource-intensive stakeholder processes. Dr. Charnley responded that her experience with the Risk Assessment and Risk Management Commission suggested that federal agencies such as the Department of Energy and Department of Defense think they have saved billions of dollars through well-managed stakeholder processes.

The third topic at the workshop was the stakeholder process involved in the Microbial Disinfection Byproduct (MDB/P) Negotiation. Ephraim King from EPA's Office of Wetlands, Oceans and Watersheds began the discussion by describing the intensive 18-month Federal Advisory Committee Act (FACA) process that resulted in the agreement. The agreement resulted in further regulation for cryptosporidium than in 1998 and agreement on a running annual average as a standard for MDP/Bs. In terms of resources, the process cost EPA \$3-5 million per year, plus \$1 million for the stakeholder process. Over 100 people worked full time inside and outside EPA on this agreement.

The FACA was composed of representatives of major interests. To represent the general public, a mayor, tribal representative and a public health official were involved. There was not an effort to identify "typical jury pool members." There was also a technical work group that preceded the FACA and provided ongoing assistance to the FACA. The technical work group took the initiative to prepare the science they believe would be required by the FACA. The FACA also gave the technical workgroup instructions on the science to be developed. A representative from the technical work group, Michael McGuire, attended all FACA meetings and served as a link between the work group. The FACA also held two workshops on scientific and technical issues. There was a massive emphasis on costs, technology, impacts and modeling. Much detail on geographic differences were presented.

Mr. King reported that the process resulted in identifying significant areas of uncertainty: in occurrence of microbes of concern, in infectivity of different strains of cryptosporidium, and in the understanding of the potential reproductive and developmental effects of MDB/Ps. The process helped participants deal with risk management questions in the face of inconclusive science and significant uncertainties on both sides of a complex question involving "risk/risk tradeoffs." They were able to assess information on tools, technologies and costs and information on parts of the country with high rates of cryptosporidium and high rates of MDB/Ps. The result was a change in policy involving running annual averages.

Executive Committee members then asked several questions that broadened the discussion to the larger panel discussing the MCB/P issue. Dr. Granger Morgan asked how the stakeholder process added value to the decision. Mr. Brian Ramalay, from Newport News Water Works and a participant in the MDB/P FACA, replied that a purely scientific evaluation conducted by the Agency alone might have led to a "no action" decision. Without stakeholder involvement, the Agency might have interpreted

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important uncertainties differently. He expressed the view that Jeff Griffiths and representatives from the National Association of People with AIDs heightened the importance of the uncertainties for the whole FACA. He asserted that the approach resulted in a superior decision. It was implementable and had the best chance of balancing benefits with practical implementation. Mr. Ramalay underscored that EPA was one of the stakeholders at the table and could "pull away" from the decision if it believed that public health was not adequately protected.

Mr. King echoed similar views. He agreed that the decision making process benefitted from public involvement. It found the middle ground. He believed that without stakeholder involvement, the Agency would not have come to the same decision and that the decision would have had less credibility. The next step is for EPA to propose a rule as negotiated by the stakeholders. Stakeholders have agreed to support the proposed regulation through the notice and comment process. Mr. King characterized the process as time-consuming, expensive, and successful.

Dr. Morgan asked whether stakeholders had any problems remaining as representatives of their groups as they participated in the FACA process. Mr. King, Ms. Abby Arnold, mediator for the process, and Mr. Ramalay all replied that participants consciously worked hard to keep their constituencies informed. Mr. Ramalay stated that he participated as a representative of the American Metropolitan Waterworks Association (AMWA), an organization of the nation's largest water agencies. He saw his role as communicating the progress of the FACA deliberations to AMWA and negotiating on behalf of AMWA.

The panel concluded with comments from Ms. Abby Arnold from RESOLVE Inc. She began with the reflection that the MDB/P negotiation process was the most comprehensive integration of science into multiparty decision making that RESOLVE has seen at EPA over the past 20 years. She described four "process elements" that brought science to the FACA in a structured way: (1) 3 technical workshops, including one on statistics; (2) a technical work group, focusing on engineering issues; (3) an expert to review and synthesize disinfection by-products health effects literature for the FACA; and (4) an expert to review microbial statistical literature for the FACA. She described the relationship between the stakeholder group and the technical people assisting them as "interactive." The stakeholder group, which included EPA, defined the science questions to be addressed and technical people reframed the questions. She gave the example of a toxicologist reframing issues associated with developmental and reproductive effects.

Ms. Arnold stated that she believed the intensive process educated members of the FACA and helped them make decisions. They were able to hear and understand, for example, very detailed explanations of why a particular monitoring approach wouldn't work. They were able to refine the question of where and how to monitor for disinfection by-products. They were able to understand the limitations of the health effects risk analysis and make decisions, even though the process did not meet industry's expectation, established prior to the just-completed FACA process, for a conclusive risk assessment. Environmental groups also were able to participate, even in the absence of such a risk

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assessment. She noted that the FACA never summarized its conclusions about health effects research in its final decision. It decided to move ahead to focus on a risk management solution without a health summary and instead focused on the risk management solution. Members of the FACA were able to decide technical issues by working from a decision-making matrix that offered tradeoff between various options for controlling for disinfection by-products as well as technical approaches to address cryptosporidium.

Dr. Richard Bull asked about the question of surrogates used in risk analysis. Mr. Ramalay replied that surrogates were consciously discussed in the FACA. Members of the FACA became comfortable with using that concept to address questions involving families of compounds.

The panel discussion concluded with a comment from the audience, from Ms. Marina Bueno, from Inside Washington. She remarked that she attended most meetings of the FACA and liked the process. It "worked for laymen." It applied the precautionary principle and focused on practical implementable approaches.

At the close of the workshop, Dr. Morgan invited Dr. Thomas Dietz, Chair of the National Resource Council (NRC) Committee on Human Dimensions of Global Change, to comment on the work of his Committee. He stated that the interplay of science and democracy is of major interest to his committee. He finds that many federal Agencies are working in this area; there is expertise in many individuals' hands, science in the area is not generally being shared. He described an NRC workshop conducted 18 months ago, where a variety of Agencies presented on the issues. As a follow-up to that workshop, his committee has begun a consensus study on the deliberative process and public participation. The study is being funded by several federal agencies, including the Environmental Protection Agency. In the spring of 2001, there will be a panel focusing on the "dimensionality" of the issue: identifying programs, processes, outcomes, and definitions of success. The NRC will then identify 6 or 8 cases where there have been replications of processes around a theme and conduct case studies. Possible candidates are forest planning, global change, and watersheds. A resulting report will provide recommendations to federal agencies on process and needed research.

Actions:

In concluding the workshop, Dr. Morgan asked members of the Executive Committee to send him and Dr. Nugent an email within the week. He asked each member to identify the key points to be made in the SAB's report resulting from the workshops.

Dr. Morgan adjourned the session at 4:45 pm with thanks to presenters and participants.